

Seventh Semester B.E. Degree Examination, Feb./Mar. 2022
Environmental Engineering – II

Time: 3 hrs.

Max. Marks:100

Note: 1. Answer any FIVE full questions, selecting at least TWO full questions from each part.
 2. Assume suitable data, if necessary.

PART – A

- 1 a. Explain the different types of sewerage system, with their merits, demerits and suitability. (09 Marks)
- b. Explain the factors affecting dry weather flow. (05 Marks)
- c. The drainage area of one sector of a town is 20 hectares. The classification of the surface of this area is as follows:

% Total surface area	Type of surface	Run off-coefficient
25	Hard pavements	0.85
25	Roof surface	0.80
15	Unpaved Street	0.30
25	Gardens and Lawns	0.15
10	Wooded area	0.10

If the time of concentration for the area is 30 minutes. Find the maximum run off. Use the following formula for intensity of rainfall $R = 900 / (t + 60)$. (06 Marks)

- 2 a. Briefly explain self cleaning velocity and non-scouring velocity. Give their standard values. (06 Marks)
- b. Briefly explain the essential requirements of a good sewer material. (08 Marks)
- c. A stone ware sewer 30cm in diameter is laid at a gradient of 1 in 100 using $N = 0.013$ in Manning's formulae. Calculate the velocity, discharge and Chezy's coefficient when the sewer is running full. (06 Marks)
- 3 a. With a neat sketch, explain the objectives, location, functions and details of a manhole. (10 Marks)
- b. Explain the following with sketches:
 i) Catch Basin ii) Oil and grease trap. (10 Marks)
- 4 a. Explain BOD and discuss the advantages and limitation of BOD. (06 Marks)
- b. Explain the nitrogen cycle of decomposition of sewage with sketch. (06 Marks)
- c. The following observations were made on a 5% dilution sample of sewage:
 D.O. of blank = 3.3mg/l
 D.O. of diluted sample after 5 days incubation = 0.89mg/lit
 D.O. of original sample = 0.55mg/l
 Calculate the ultimate BOD of sample. Assume $K_D = 0.1/\text{day}$. (08 Marks)

PART – B

- 5 a. Briefly explain factors affecting self-purification process. (08 Marks)
- b. Explain the phenomenon of self-purification of natural streams subjected to pollution with the help of oxygen-sag curve indicating the salient features? (12 Marks)

- 6 a. Write the flow diagram employed for a municipal waste water treatment plant. Indicate the importance of each unit indicated in the flow diagram. (10 Marks)
- b. Design a suitable rectangular sedimentation tank, provided with a mechanical cleaning equipment for treating the sewage from a city provided with assured public water supply system with a maximum daily demand 12MLD. Assume detention period of 2 hours, effective depth in tank 3m, velocity of flow as 0.3m/minutes and 80% of water supplied will become sewage. (10 Marks)
- 7 a. Give the comparison between conventional and high rate trickling factors. (08 Marks)
- b. Explain the following terms:
- i) Bulking of sludge
 - ii) Rising of sludge
 - iii) Food to micro-organisms ratio
 - iv) Sludge volume index. (12 Marks)
- 8 a. Explain the different stages involved in the sludge digestion process in a "Digester", with a sketch explain the construction details of sludge digestion tank. (10 Marks)
- b. Write a explanatory notes with a sketch on oxidation pond and oxidation ditch. (10 Marks)

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